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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
KIM, KEVIN	

ART UNIT	PAPER NUMBER
2611	

DATE MAILED: 11/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/988,417	BOHNKE ET AL.	
	Examiner	Art Unit	
	Kevin Y. Kim	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *31 August 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *2-15 and 17-28* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *5-8,14,15,18-28* is/are rejected.

7)☒ Claim(s) *2-4,9-13 and 17* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on August 31, 2006 has been entered.

Response to Arguments

2. Applicant's arguments filed 8-31-2006 have been fully considered but they are not persuasive.

Applicant asserts that the Greenstein patent fails to teach adjusting the phase and/or amplitude in accordance with a detected subcarrier channel response vector. However, the Greenstein patent teaches the use of a plurality of pilot tones. One case is that all the tones are used as pilot tones, and thus the phase and/or amplitude characteristics of each sub-carrier adjusted in response to detected channel response. See col. 5, line 45 ~ col.6, line 10 and patent claim 14 in particular.

In addition, a new prior art reference, a US patent to Espax et al, has been found to anticipate or render obvious some of the claims, as set forth below.

Claim Rejections - 35 USC § 102

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 21-28, 5-7,14,18,20 are rejected under 35 U.S.C. 102(e) as being anticipated by Espax et al (US 6,373,433).

Claim 21.

Espax et al discloses a method for transmitting signals using a plurality of subcarriers through a plurality of antenna elements (4,5,6) in a wireless transmission system (i.e. OFDM), comprising the steps of:

detecting channel response vectors, by a channel estimator (19), corresponding to the plurality of antenna elements, wherein each of the channel response vectors includes subcarrier related elements corresponding to the plurality of subcarriers (see col.5, lines 43-45, 61-63 and 65-67 in particular) and

adjusting transmission characteristics of the plurality of subcarriers in accordance with amplitude and/or phase of at least one of the detected channel response vectors (see col. 6, lines 20-25).

Claim 22.

Espax et al discloses a method for transmitting signals using a plurality of subcarriers in a transmission system, comprising the steps of:

generating the signals by using a plurality of antenna elements (4,5,6),

obtaining vector elements indicating channel transmission characteristics of the plurality of subcarriers at each of said plurality of antenna elements, wherein each of said vector elements is associated with one of said plurality of sub-carriers (see col.5, lines 43-45, 61-63 and 65-67 in particular) and

adjusting amplitude and/or phase of each of the plurality of subcarriers in accordance with the channel response vectors (see col. 6, lines 20-25). Note that, although a weight adjustment for a sub-band comprising of a plurality of sub-carriers is taught as preferable because of low overhead, this description effectively describes an embodiment, albeit less desirable, applying weights to respective sub-carriers individually)

Claim 23.

Espax et al discloses a method for transmitting signals using a plurality of subcarriers in a transmission system, comprising the steps of:

generating the signals by using a plurality of antenna elements (4,5,6),

adjusting amplitudes and phases of plurality of subcarriers based on channel response vectors indicating channel transmission characteristics of the plurality of subcarriers at each of said plurality of antenna elements. See col. 6, lines 20-25.

Claim 24.

Expax et al discloses a method for transmitting OFDM symbols by using a plurality of OFDM subcarriers in an OFDM transmission system (see col.4, lines 25-35), comprising the steps of:

generating the OFDM signals to be transmitted by using a plurality of antenna elements (4,5,6),

obtaining channel response vectors corresponding to the plurality of antenna elements, wherein each of the channel response vectors includes subcarrier related elements corresponding to the plurality of subcarriers (see col.5, lines 43-45, 61-63 and 65-67 in particular), and

applying weighting value to each of said plurality of subcarriers in accordance with a complex conjugate of the channel response vectors. See col. 6, lines 20-25.

Claims 25 and 26.

Espax et al discloses a method and apparatus for transmitting an orthogonal frequency division multiplex (OFDM) signal by using a plurality of antenna elements (4,5,6) at a base station (1) in a wireless transmission system, wherein the OFDM signal comprises a plurality of subcarriers, comprising:

first elements (19) for detecting frequency channel characteristics of each subcarrier of the OFDM signal for each of said plurality of antenna elements (see col. 5, lines 61-63), adjusting at least one of the amplitude and phase of each subcarrier in accordance with the detected characteristics of the corresponding subcarrier frequency channel or all subcarrier frequency channels (see col. 6, lines 23-24 and note that, although a weight adjustment for a sub-band comprising of a plurality of sub-carriers is taught as preferable because of low overhead, this description effectively describes an embodiment, albeit less desirable, applying weights to respective sub-carriers individually), and

transmitting the OFDM signal by using the adjusted subcarriers via said plurality of antenna elements.

Claims 27 and 28.

The detected frequency characteristics are subcarrier channel response vectors. See col.5, lines 65-67.

Claims 5 and 18.

The phase of each of sub-carriers could be adjusted in response to detected frequency channel characteristics since the applied weights affects both the gain (in turn, amplitude) and phase. See col. 5, lines 43-45.

Claim 6.

The application of weights to respective antennas amounts to selecting an antenna having the best channel characteristics since antennas with highly poor channel characteristics would not be used.

Claim 7.

The application of weights to respective antennas amounts to distributing power of the transmission signal to all of the plurality of antenna elements since the weights include the amplitude gain adjustment.

Claim 14.

Espax et al teaches probing signals, i.e., "pilot symbols," for determining channel response.

Claim 20.

The transmitter (1) reads on the base station.

5. Claims 21-26,6, 7, 14 and 18 are rejected under 35 U.S.C. 102(e) as being anticipated by Greenstein et al (US 6,131,016 cited previously).

Claim 21.

Greenstein et al discloses a method for transmitting signals using a plurality of subcarriers through a plurality of antenna elements (16,17) in a wireless transmission system (i.e. OFDM), comprising the steps of:

detecting channel response vectors corresponding to the plurality of antenna elements, wherein each of the channel response vectors includes subcarrier related elements corresponding to the plurality of subcarriers (see col.4, line 53 ~ col.5, line 37 describing the obtaining of various channel response vectors) and

adjusting transmission characteristics of the plurality of subcarriers in accordance with amplitude and/or phase of at least one of the detected channel response vectors (see col. 4, lines 5-12).

Claim 22.

Greenstein et al discloses a method for transmitting signals using a plurality of subcarriers in a transmission system, comprising the steps of:

generating the signals by using a plurality of antenna elements (16,17),

detecting vector elements indicating channel transmission characteristics of the plurality of subcarriers at each of said plurality of antenna elements (see col.4, line 53 ~ col.5, line 37 describing the obtaining of various channel response vectors and col. 4, lines 49-52 describing the transmission characteristics can be done at the transmission antenna) and

adjusting transmission characteristics of the plurality of subcarriers in accordance with amplitude and/or phase of at least one of the detected channel response vectors (see col. 4, lines 5-12).

Claim 23.

Greenstein et al discloses a method for transmitting signals using a plurality of subcarriers in a transmission system, comprising the steps of:

generating the signals by using a plurality of antenna elements (16,17),

detecting vector elements indicating channel transmission characteristics of the plurality of subcarriers at each of said plurality of antenna elements (see col.4, line 53 ~ col.5, line 37 describing the obtaining of various channel response vectors and col. 4, lines 49-52 describing the transmission characteristics can be done at the transmission antenna) and

adjusting amplitudes and phases of plurality of subcarriers based on channel response vectors indicating channel transmission characteristics of the plurality of subcarriers at each of said plurality of antenna elements. See col.5, lines 30-33.

Claim 24.

Greenstein et al discloses a method for transmitting OFDM symbols by using a plurality of OFDM subcarriers in an OFDM transmission system, comprising the steps of:

generating the OFDM signals to be transmitted (see col. 3, lines 35-37) by using a plurality of antenna elements (16,17),

obtaining channel response vectors corresponding to the plurality of antenna elements, wherein each of the channel response vectors includes subcarrier related elements corresponding to the plurality of subcarriers (see col.4, line 53 ~ col.5, line 37 describing the obtaining of various channel response vectors), and

applying weighting value to each of said plurality of subcarriers in accordance with a complex conjugate of the channel response vectors. See col.5, lines 30-33.

Claims 14, 18, 20, 25 and 26.

Greenstein et al discloses a method and apparatus for transmitting an orthogonal frequency division multiplex (OFDM) signal by using a plurality of antenna elements (16,17) at a base station (10) in a wireless transmission system, wherein the OFDM signal comprises a plurality of subcarriers, comprising:

detecting frequency channel characteristics of each subcarrier of the OFDM signal for each of said plurality of antenna elements (see col. 4, line 20 ~ col. 6, line 10),

adjusting at least one of the amplitude and phase of each subcarrier in accordance with the detected characteristics of the corresponding subcarrier frequency channel or all subcarrier frequency channels (see col. 4, lines 1-12), and

transmitting the OFDM signal by using the adjusted subcarriers via said plurality of antenna elements.

It should be noted that the down link tones are grouped into subsets of M consecutive tones (where M is an odd number) such that Mx(tone spacing) is less than the correlation band. An extreme case is that each tone is selected as a pilot tone, thus meeting the limitation of "detecting frequency channel characteristics of each subcarrier of the OFDM signal." See col.5, line 45 ~ col.6, line 10.

Claim 6.

Greenstein et al discloses selecting an antenna element having the best channel characteristics. See col. 4, line 59 ~ col.5, line 7.

Claim 7.

Greenstein et al discloses distributing the power of the transmission signal to all of the antennas according to subcarrier frequency characteristics of a corresponding antennal element. See col. 5, lines 24-37.

Claim Rejections - 35 USC § 103

6. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

7. Claims 8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greenstein et al or Espax et al, as applied to claims 25 and 26 above respectively, in view of Minami et al (US 6,587,510 previously cited).

Greenstein et al or Espax et al discloses all the subject matter claimed, as explained above, but for limiting an adjustment of the magnitude of the subcarrier signal to an upper threshold.

Minami et al teaches limiting the adjustment of transmission power to an upper threshold for the purpose of maintaining a proper carrier to interference ratio. See col. 6, lines 15-25. Thus, it would have been obvious to one skilled in the art at the time the invention was made to limit an adjustment of the magnitude of the subcarrier signal to an upper threshold when the amplitude is adjusted in response to detected channel characteristics in the system of Greenstein et al or Espax et al for the purpose of maintaining a proper carrier to interference ratio, as taught by Minami et al.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Greenstein et al or Espax et al, as applied to claim 25 above, in view of Ocenasek et al (US 6,674,324 cited previously).

Greenstein et al or Espax discloses all the subject matter claimed, as explained above, but for a computer software program configured to implement the method defined in claim 25 when run on a computing device of a transmitting device. However, a software implementation of a method performed by a hardware, using a program and a computer, is notoriously well known in the art, as evidenced by Ocenasek et al describing a device in the same field of endeavor (see col. 15, lines 35-44) and thus would have been obvious to one skilled in the art at the time the invention was made as an alternative implementation.

Allowable Subject Matter

9. Claims 2-4, 9-13 and 17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Y. Kim whose telephone number is 571-272-3039. The examiner can normally be reached on 8AM --5PM M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jay Patel can be reached on 571-272-2988. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

October 31, 2006

AU 2611

/Kevin Kim/

KEVIN KIM
PRIMARY PATENT EXAMINER